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COMPLETE SPECIFICATION

Process for the Production of Cut Stones in the Form of Parallel Blocks from the Natural Rock and Apparatus for Carrying Out the Process

I, ARMAND CORBIN, of 1, avenue du Président Wilson, Paris 16e, (Seine), France, of Israeli nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

For the production of cut stone from natural rock, it has previously been proposed to use machines consisting of saws which make the successive cuts, enabling one stone to be removed at a time. The work is long, due to the fact that each stone extracted necessitates an adjustment of the machine, and of the complete succession of working operations accompanying the removal of a single stone.

The present invention avoids these disadvantages in providing a process for the production of cut stones of parallelepipedic shape from natural rock, characterised by carrying out with the aid of an apparatus by which parallel cuts simultaneously and, either equidistant or otherwise, perpendicularly to the working face, then a horizontal cut under the blocks to be detached, and then a vertical cut behind the blocks, which enables a series of cut stones to be removed.

The invention also applies to a machine assembly for carrying out the process of extraction comprising circular saws mounted in parallel on a single shaft mounted on a moving frame for effecting simultaneously transverse parallel cuts perpendicular to the working face, and a horizontal circular saw and a vertical circular saw being mounted on a further moving frame and duly operated for carrying out the horizontal cut from beneath and the vertical cut behind the blocks.

According to another characteristic of the invention, the circular saws perpendicular to the working face of the natural rock are mounted to slide on their common shaft to enable their spacing from one another to be varied.

According to one method of carrying out the

invention, the shaft carrying the circular parallel saws perpendicular to the working face is supported by two solid flanks of a frame carrying the control motor and adapted to carry out a sliding vertical movement in a frame which can be displaced horizontally and perpendicularly to the working face on a second moving chassis parallel to the working face.

Various other characteristics of the invention will furthermore be clear from the detailed description which follows.

One method of carrying out the invention adapted for cutting stones according to the process of the invention, is shown by way of example in the accompanying drawings.

Figure 1 is a perspective showing the disposition of the different cuts;

Figure 2 is a front elevation of the device adapted for effecting the vertical cuts perpendicularly to the working face;

Figure 3 is a plan view corresponding to Figure 2;

Figure 4 is a lateral elevation corresponding to Figures 2 and 3;

Figure 5 is a front elevation of the device adapted for effecting simultaneously the horizontal cut perpendicularly to the working face and the parallel cut inward of the face.

In Figure 1 the cutting means are disposed on a surface 1 perpendicular to a working face 2 obtained after having exposed the rock. Vertical cuts or grooves 3 perpendicular to the working face are first carried out by a first device displaceable on the surface 1 and comprising four or more circular saws. A second device working in combination with the first device is displaceable in the same way on the surface 1 and simultaneously effects a horizontal cut 4 and a vertical cut 5 parallel to the working face. These cuts 4 and 5 are respectively effected with the aid of a horizontal saw 6 and a vertical saw 7, both mounted on the second cutting device. These cuts 3, 4 and 5 enable blocks of parallelepiped shape of any dimensions, which can be of different lengths

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when the parallel saws are at different distances apart, to be secured.

The device adapted for carrying out vertical perpendicular cuts at the working face 2 (Figures 2, 3 and 4) comprises essentially a chassis 8 supported on wheels 9 and adapted to be displaced on wheel track formed by rails 10 placed on the surface 1 parallel to the working face. A frame 11, consisting of two lateral frame members 12, 13, can be displaced on the chassis 8 perpendicularly to the working face by means of two toothed wheels 14 and 15 and two toothed wheels 16 and 17. The axes of the two wheels 14 and 15 are integral with the lateral frame member 12, and the axes of the toothed wheels 16 and 17 are integral with the lateral frame member 13. The toothed wheels 14 and 15 and the toothed wheels 16 and 17 engage respectively with racks 18 and 19 secured on the chassis 8. Control of the displacing mechanism constituted by the toothed wheels 14, 15 and 16, 17 and the racks 18 and 19 may be mechanical, electrical, manual or in any other convenient manner. A second frame 20 formed by two lateral frame members 21, 22 and an upper frame 23 are vertically displaceable in the frame 11 by means of guides 24, 25, 26, 27, provided on the lateral frames 21, 22 and are adapted to slide in guides 28, 29 and 30 and 31, integral with the lateral frame members 12 and 13 of the frame 11. A winch 32 is provided with a screw 33 which engages in a hole 34 formed in a part 35 integral with the frame 11. The screw 33 and an upper screw-threaded part 33a screws into a tapping 36a of a transverse member 36 of the upper frame member 23 of the frame 20. In turning the winch in one way or the other, the frame 20 is caused to move upwardly or downwardly in the frame 11. Two flanking side members 37 and 38 are secured on the frame members 21 and 22 of the frame 20 and carry two bosses 39 and 40 adapted to support a shaft 41. Two circular saws 42 and 43 are secured on the shaft 41, the extremities of which are integral with sleeves 44 and 45 adapted to receive shafts 46 and 47. The shafts 46 and 47 which can be secured in the sleeves 44 and 45 by keys, pins, bolts or the like, carry the vertical circular saws 48 and 49. An electric motor 50 is secured on a solid plate of the lateral frame member 22 of the frame 20. The shaft of the motor 50 is connected to the shaft carrying the circular saws by means of two pulleys 51 and 52 and a belt 53. The tension of the belt 53 is assured by a roller 54 rotating on the axle 55 secured to the two flanking side members 37 and 38.

The device operates as follows: The device is taken to the place desired by displacement along the rails 10. The two extreme end saws 48 and 49 can then be adjusted in the sleeves 44 and 45 to give cuts at the same or different distances from those effected by the use of the circular saws 42 and 43. The saws 42 and 43 can also equally well be secured in any place in

such a way as to obtain cuts effecting an equal distance or different distances one or the other according as it is desired to obtain stones of equal or different lengths. The saws are then adjusted in height by turning the winch 32 and thus disposing vertically the frame 20 in the frame 11. The device being then adjusted in length and in height, the cuts are effected by causing the displacement of the frame 11 on the two racks 18 and 19. The vertical cuts 42, 43, 48 and 49 being displaced perpendicularly to the working face 2 then come to cross the cuts 3 (Figure 1).

A second device operating in conjunction with the first, is adapted to effect horizontal cuts perpendicular to the working face 2 and vertical cuts parallel to the working face. This device (Figures 5, 6 and 7) consists essentially of a chassis 56 movable on rails 10 by means of wheels 57. The device is displaced as in the preceding case on the surface 1 parallel to the working face 2 in the direction of the arrow F_1 (Figure 1). This movement can be obtained, for example, by the use of a toothed wheel engaging with a rack secured on the surface 1. The chassis 56 comprises a lateral frame 58 the length of which can displace a frame member 59 serving to support the control mechanism and the adjusting of the vertical saw 7 parallel to the working face 2. The vertical displacement of the frame member 59 on the frame 58 is obtained by a winch 61 integral with a screw 61a screwed in a tapping of the frame 58 and secured to the frame member 59. The frame member 59 consists of two lateral slides 62 and 63 adapted to receive vertical guides 64 and 65 integral with the frame 58. An electric motor 66 secured on the frame member 59, is connected by two pulleys 67 and 68 and a belt 69 to the shaft 70 of the saw 7. The shaft 70 is supported in two bosses or bushings 71 and 72 secured to the frame member 59.

The chassis 56 comprises moreover, two slides 73 and 74 adapted to receive guides 75 and 76 of a frame 77 transverse to the rails 10. This frame can be displaced perpendicularly to the working face 2 by means of a winch 78 formed with a threaded screw 78a. The rear part of the frame 77 supports an electric motor 79, the outgoing shaft 80 of which is connected to the shaft 81 of the horizontal saw 6 by two pulleys 83 and 84, and a belt 85. The shaft 81 can slide in a sleeve 86 integral with the frame 77 and can be secured from the outside in any desired position by means of a handle 87. In the position of rest, the saws 6 and 7 are in the positions 6a and 7a (Figure 1) respectively. The device being in the starting position, the motors 66 and 79 are started and the saws 6 and 7 effect the first cuts to come into position in the places represented in Figures 5, 6 and 7.

When the saws have reached the desired depth, the whole apparatus is displaced on the surface 1 in the direction of the arrow F_1 (Figure 1), which enables the cuts 4 and 5 to be

effected. The vertical saw 7 can also be displaced in front of the horizontal saw 6 in such manner that the rotation of the saw 6 ejects the stone by centrifugal force.

- 5 The speed of operation of the device for effecting the vertical cut perpendicular to the working face can be calculated in such manner that the second device which follows it is displaced continuously from one end to the other of the stretch of the natural rock being dealt with. Furthermore the combination of the two devices enables blocks of parallelepipedic shape of different lengths to be obtained once the adjustment in height has been effected.
- 10
- 15 Instead of displacing the device on rails the two devices can be displaced directly on the surface 1, in which case they are provided with pneumatic wheels. Similarly a support can be provided placed parallel to the working face, and consisting of arms displaced on the support parallel to the working face, the two devices being suspended from these arms.
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WHAT I CLAIM IS:

1. Process for producing cut stone in the form of parallelepiped shaped blocks from natural rock, in which parallel cuts are first provided by a number of devices simultaneously and equidistant or otherwise and perpendicular to the working face, followed by horizontal cut under the block to be detached and a vertical cut behind the blocks.
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2. Apparatus for carrying out the process according to claim 1, in which there is provided a pair of frames that can be moved over the natural rock one behind the other, the first frame so supporting a single driven shaft carrying a number of longitudinally spaced circular saws that the shaft lies parallel to the direction of motion of the associated frame and can be moved at right angles to said direction of motion to make the first series of cuts in the stone, whilst on the second frame are supported
- 35
- 40

a pair of circular saws for making the horizontal and vertical cuts.

3. Apparatus according to claim 2, in which the circular saws perpendicular to the working face are mounted in such manner as to slide on a common shaft to enable their insertion to be varied.
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4. Apparatus according to claims 2 and 3, in which the shaft carrying the circular saws, parallel and perpendicular to the working face is supported by two solid flanks of a frame in spaced brackets on a third frame that carries the control motor and can be moved in vertical guides forming part of the fourth frame, which can be disposed horizontally and perpendicularly to the working face on the first frame that is movable parallel to the working face.
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5. Apparatus according to claim 4, in which the vertical movement of the third frame is controlled by a screw-threaded spindle mounted in such manner as to be adapted to turn, but so as not to be displaceable on this frame, thus coming into engagement with a fixed nut carried by the first frame.
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6. Apparatus according to claim 4 or 5, in which the fourth frame movable horizontally carries handles engaging with the racks, carried by the first frame.
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7. Apparatus according to claim 2, in which the vertically cutting saw is mounted on a vertically movable frame horizontally movable on a lateral frame laterally adjustable relative to the second frame, the lateral frame carrying at one end in cantilever fashion the vertically adjustable, horizontally cutting saw, the vertical and lateral frames carrying motors and drive transmission means for the vertical and horizontally cutting saws.
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8. Apparatus substantially as hereinbefore described and illustrated in the accompanying drawings.

(Signed). A CORBIN.

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3 SHEETS

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Sheet 1

Fig.1.

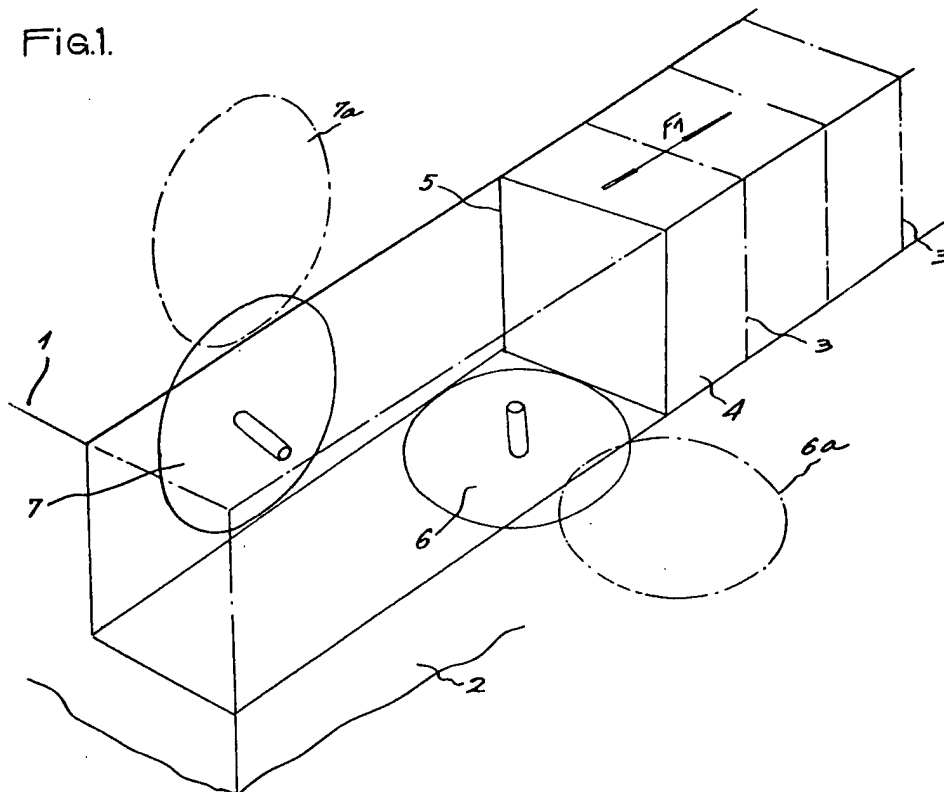
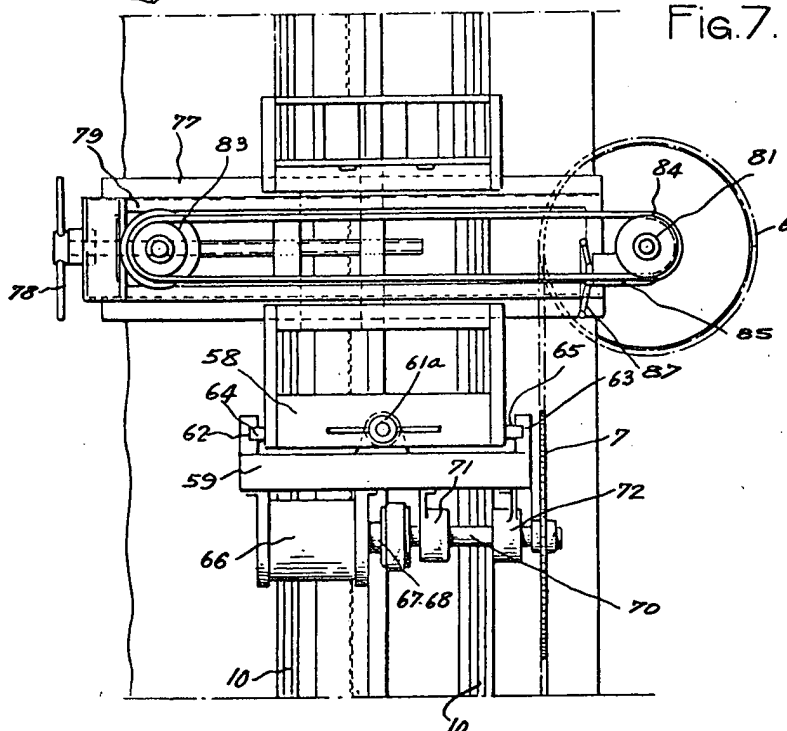


Fig.7.



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Fig.2.

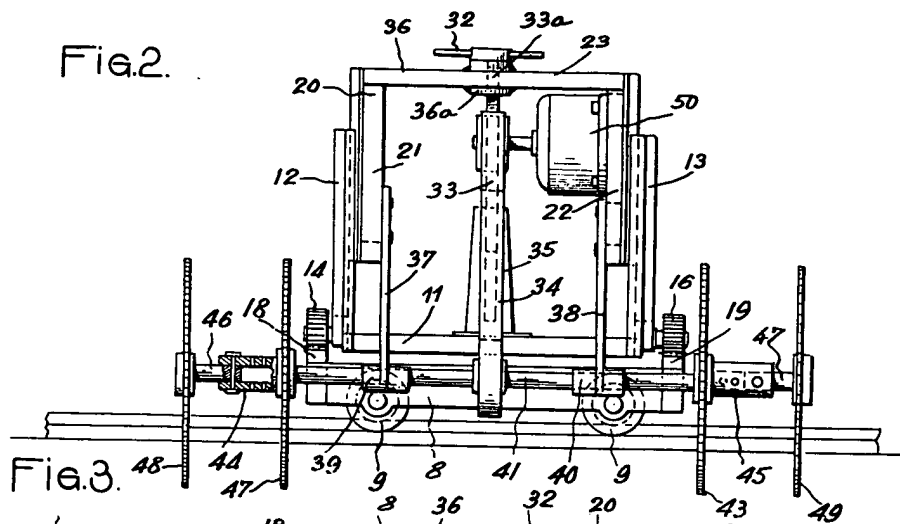


Fig.3.

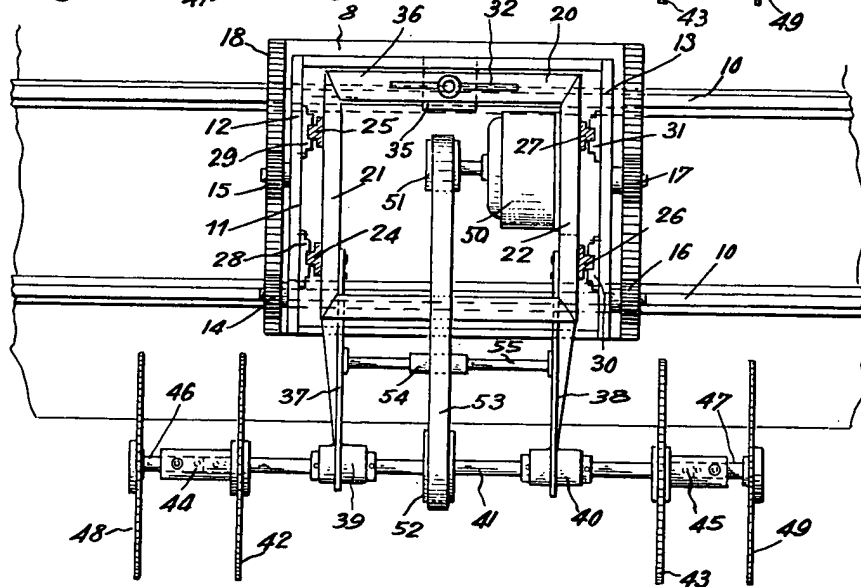
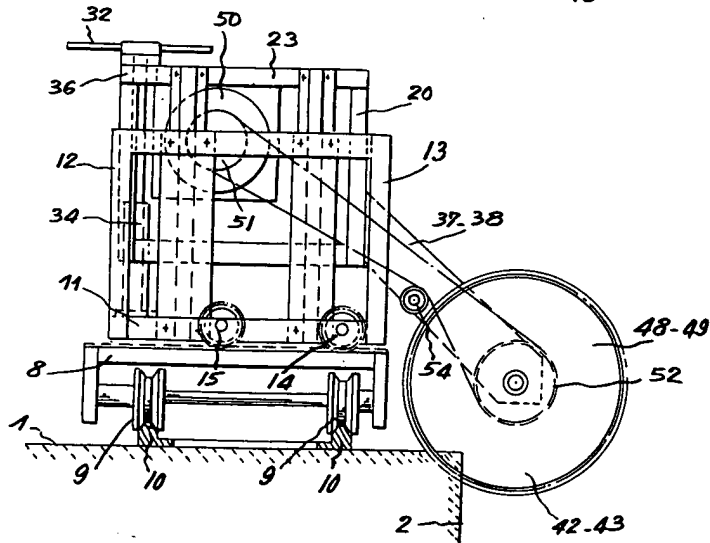


Fig.4.



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FIG.5.

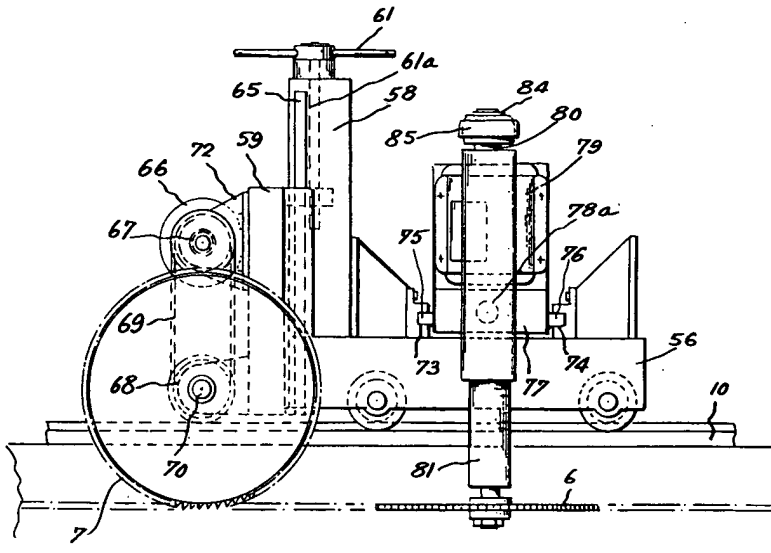


FIG. 6.

